Quarterly
Technical Project Status Report
1st Quarter - 2007

Integrating NASA Earth Observation Data into National Applications

State, Local and Regional Government Applications

Grant Number: NNS06AA88G

Submitted to:
Internal

Remote Sensing and GIT for Government Applications

Subtask: Rapid Prototyping of a Decision Support System/Tool for SLR Government

Project Overview

The objective of this subproject is to develop geospatial decision support tools for use and integration by State, Local, and/or Regional Government programs. Open source geospatial visualization and integration technologies continue to evolve at a rapid pace. IAGT is developing data integration and decision support tools that draw from a range of available software (i.e., NASA World Wind, Google Earth, Geoserver, MapServer, ArcGIS) leveraging XML-based web services and open source Web Mapping Services (WMS) and Web Feature Services (WFS) all drawing from common relational data models. Efforts under this task are focused on not one, but several approaches to creating prototype DSS/DSTs for specific SLR government applications. Several NEAF partner states are participating in this effort through funded partnerships under this task.

Current Project Status

During the first quarter of 2007, progress continued in the development of individual initiatives under this sub-project as follows.

- Watershed Characterization
- Impervious Surface Assessment
- Phosphorous Loading Analysis Tools
- Hydrologic Event Analysis Tools

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Subtask: Watershed Characterization

Project Overview

This project is being conducted in cooperation with the University of Connecticut Geospatial Technology Program at the Center for Land Use Education and Research (CLEAR), with the goal of developing GIS based analytical tools for assessing watershed characteristics to support water allocation planning programs within the state. Work conducted under this project will support the development of a digital geospatial database and graphical user interface to support water allocation planning.

All project files and supporting documentation are being stored on P:\Integrated_Apps_Gov_Apps\144_Rapid_Prototyping\StreamStats

Recent Accomplishments

- Completed UCONN MOU and Scope of Work. Documents located on the server. Also refer to the UCONN project website at:
  http://clear.uconn.edu/geospatial/iwr.htm
- Investigated the potential utility of WRAP Hydro (Water Rights Analysis Package) as an augmentation tool for the CT IWR efforts:
  http://www.crwr.utexas.edu/gis/gishydro03/WRAPhydro/WRAPhydro.htm
  http://ceprofs.tamu.edu/rwurbs/wrap.htm

WRAP Hydro allows users to work with large regional raster datasets. Parameters written as attributes to vector features. Relies on grid summarization and attribute consolidation.

- Preliminary investigation of the utility of PRISM versus DAYMET meteorological data for input into NRCS Curve Number runoff calculations.

Outstanding Issues

- None

Near-term Goals

- Meet with UCONN and the Technical Advisory Committee (CT IWR and CT DEP) (rescheduled for May 5).
- Establish informal Workplan for IAGT staff to contribute the CT IWR efforts
- Complete an IAGT Project Charter and Project Planning documents as they related to this effort.

Subtask: Phosphorous Loading Analysis Tools

Project Overview

The objective of this project is to develop tools and guidance for local government stormwater and water quality programs by specifically targeting phosphorous as a nutrient or contaminant of concern, and by comparing the results of various protocols and approaches on a pilot watershed.

Using several different approaches to evaluating phosphorous loading including Export Coefficient Modeling (ECM), Variable Source Area Hydrology (VSA), Riparian Buffers (RBDE), and NRCS Curve Number Methods (NRCS CN), develop each methodology on a pilot watershed in order to quantitatively and descriptively evaluate factors such as the cost of implementation, technical capacity required for implementation, and the overall value of the results for aiding in targeted decision making at the local government level on land use and water quality improvement projects. This is the second phase of an effort begun under a previous grant.

All project files and supporting documentation are being stored on P:\Integrated_Apps_Gov_Apps\144_Rapid_Prototyping\P-Project

Recent Accomplishments

- VSA
  - None. This project is being conducted in cooperation with Cornell University and will be initiated in the second quarter of 2007.
- ECM
  - IAGT built a model construct in accordance with research completed at SUNY ESF, converting ArcInfo AML routines into ArcGIS Model Builder and implementing them in the Owasco Lake Watershed.
  - Conducted coordination with Ted Endreny at SUNY ESF to confirm model approach and limitations, began developing model scenario runs with limited success.
- RBDE
  - Began testing pilot protocols on Owasco Lake Basin
  - Continued the development of high resolution stream network in Owasco Lake Basin with coordination from NYS NHD program
  - Submitted proposal to Ontario County to conduct jointly funded project
- NRCS
  - SUNY ESF recently completed pilot work on a model for Carmens River on Long Island and is looking for partnership to implement the model in upstate NY
  - Began initial research into GRID based processing for curve number generation using various models including N-SPECT, P-LOAD, and others.

Outstanding Issues

- Advancing both RBDE and NRCS CN projects is currently coupled with external funding potential and may delay the planned execution of the projects. Both are still anticipated to be completed by end of calendar year 2007, with the benefit of having expanded scopes of work due to external funding.
- RBDE external funding is being negotiated with Ontario County Department of Planning and the Canandaigua Lake Watershed Association.
- NRCS CN funding is being negotiated with the NYS Department of State.

Near-term Goals

- Complete agreement and begin work with Ontario County on RBDE project
- Complete agreement and begin work with Cornell on VSA project
- Conduct a comprehensive review of ECM protocols and finalize findings with recommendations for further study
- Complete agreement with SUNY ESF and NYSDOS on NRCS CN project

Subtask: Hydrologic Event Analysis Tools

Project Overview

This project will be conducted in cooperation with the University of Wisconsin Sea Grant Institute with the goal of providing a comprehensive way to visualize and integrate sensor based hydrologic data from various sources into an application for assessing flow and water quality issues.

The project will integrate available sensor based hydrologic data such as gage data, buoy data, precipitation data, and remotely sensed data such as NEXRAD and MODIS. This project will develop a browser based prototype application based on open source technology to evaluate hydrologic events based on the integration of temporal as well as spatial data for visualization and analysis. This is the second phase of an effort begun under a previous grant designed to integrate data sources from multiple sources across several states in the NEAF region.

All project files and supporting documentation are being stored on P:\Integrated_Apps_Gov_Apps\144_Rapid_Prototyping\Hydrologic Event Analysis

Recent Accomplishments

- Project formalized into two parallel work activities:
  - UWISC efforts to develop the Hydrologic Dashboard
  - IAGT efforts to develop the FLoWEN systems architecture
- Hydrologic Dashboard
  - Received Progress Report for 2006 efforts from UWISC. Posted on the server.
  - Received Progress update as of 3/29/06 from UWIS. Posted on the Water Resources FORUM (http://www.iagt.org/ccdss/forum/)
  - Project was presented at the NOAA Coastal Services Center Conference in early March (Coastal GeoTools '07). Presentation posted on the server.
  - UWISC completed conversion of MATLAB algorithms to PERL for screening significant hydrologic events (baseflow separation) from USGS gage data
  - Implemented PostGRES database based on initial prototyping in SQLite, completed automatic update routines from USGS gage data
  - Completed an initial mockup of the GUI,

- FLoWEN
  - Acronym based on Finger Lakes Watershed Environmental Network
  - Investigated the implementation of the CUAHSI based Observations Data Model, along with related models such as Transducer Markup Language (TML), Sensor Markup Language (SML), and HydroML. The CUAHSI ODM is the most mature and appears to have the greatest potential for adaptability for this project.

- Completed the connectivity to a number of environmental data sources such as the Cayuga County water gages (via Flowlink software), and the new weather station (www.iagt.org/weather).

Outstanding Issues

- None

Near-term Goals

- Hydrologic Dashboard
  - Automate the ingest of new USGS data with complete event filtering for each gage in the study area
  - Establish algorithms for NEXRAD precipitation calculations. This requires basin delineation from DEM and automated extraction of NEXRAD data based on time window established in the event filter.
  - Establish automated link between event filter date range and MODIS WMS services being provided by ERSC at UWISC.
  - Advance prototype viewer to include open source graphing functionality
  - Develop initialization routines for adapting the Dashboard to new gage areas.
- FLoWEN
  - Manually test the process of loading various sensor data into an ODM based database
  - Automate the ingest of sensor data into a SQLServer based ODM.
  - Add additional data sources to the data inventory for the Finger Lakes
  - Complete connectivity to USGS NWIS webservices and replicate CUAHSI based graphing tools (based in Excel) for FLoWEN data sources.
  - Begin development of a data viewer based on the generation of hydrographs over a specific date range.
  - Complete the FLoWEN Project Charter and other Project Planning documents and conduct a formal project kickoff with IAGT staff.

Sub-Tasks:
Develop State, Local (SLR), Regional Government Requirements;
Evaluate Existing Decision Support Systems/Tools;
Review NASA Earth Sun system Satellite Missions;

Project Overview
These 3 sub-tasks have been structured to be closely related and the first to be completed, *Develop State, Local, Regional Government Requirements,* will lay important ground work for the other two. The tasks will be completed quickly (target completion to be by the end of the 2nd quarter, 2007) and provide overview reports of the topics for use as resources for future projects. Pedro Florez located at the National Association of Counties (NACo) will be instrumental in completing all 3 of these efforts, starting with a national view point and insight into SLR requirements to address regulatory concerns. Once these are determined, evaluations of NASA supported DST's and Satellite missions will be made as to their applicability for use by SLR's to assist in addressing their needs.

Current Project Status
Current activities include:

- Routine teleconference/work sessions to discuss project status, strategies and next steps.
- Correlations are being made between identified NACo priority regulatory areas and NASA National Priority Areas.
- As the Requirements project progresses and takes shape, planning continues for how to address the next two projects.

Recent Accomplishments

- Budget and scheduling issues were discussed and a plan established in conjunction with discussion about completion of the Integrated Applications grant as a whole.
- A first level matrix was developed comparing a "laundry list" of NACo priority areas with NASA Priority areas.
- The matrix was discussed at length by team members and the next steps to consolidate the information and reduce its scope were developed.

Outstanding Issues

- None.

Near-term Goals

- Complete a quantification/ranking scheme along with other possible "filters" to reduce the matrix of Priority areas to those most applicable to SLR needs.
- Begin narrative(s) describing chosen NACo priority areas and correlation of NASA priority areas.
- Analyze NACo/SLR regulatory environments for correlated areas and develop narrative summary.

Subtask: Develop a Methodology for Lake Water Clarity Modeling in the North Eastern United States

Project Overview

The focus of this sub-project is to develop a methodology for using Landsat imagery to map the lake water clarity of water bodies in the north eastern United States, starting with New York state as a testing area, and later branching out to other states. The motivation of this project is well-established, as evidenced in results from talks with IAGT partners throughout the north east. Preliminary work for this sub-project was done as a small prototype effort under the CCDSS-USGS project as a way of validating and verifying the protocol. The objective is to develop the lake water clarity methodology that can be applied to the NE region as a way to respond to EPA requirements for assessing lake water quality in 2007.

Current Project Status

Current activities include:

- Acquisition of additional Landsat 5 and Landsat 7 scenes in NY to be used in the project.
- Finalization of NHD inland water bodies data so that they spatially correspond to lakes in the Landsat imagery.
- Testing of the protocol on a subset of imagery so that the methodology can be documented. This will save time when the entire state is processed by the project team.
- Weekly or bi-weekly project meetings are underway to review current status of the project and plan upcoming work.

Recent Accomplishments

- Searched through Landsat 5 and Landsat 7 scene archives for NY state to select which scenes are best for the project.
- The project team held weekly meetings to help move the project along and schedule tasks among team members.
- Searched and isolated lake water sampling data points that will be used to correlate lake water clarity measurement in the Landsat imagery.
- Reviewed the protocol with the project team and went through the process step-by-step so that all team members are clear on the work that needs to be done.
- Ran a demonstration of S-Plus statistical analysis software as part of an effort to train members of the project team who were not familiar with how to use it.

Outstanding Issues

- None.

Near-term Goals

- Finish the lake water clarity assessment of NY state by the end of the 2nd Quarter, 2007.